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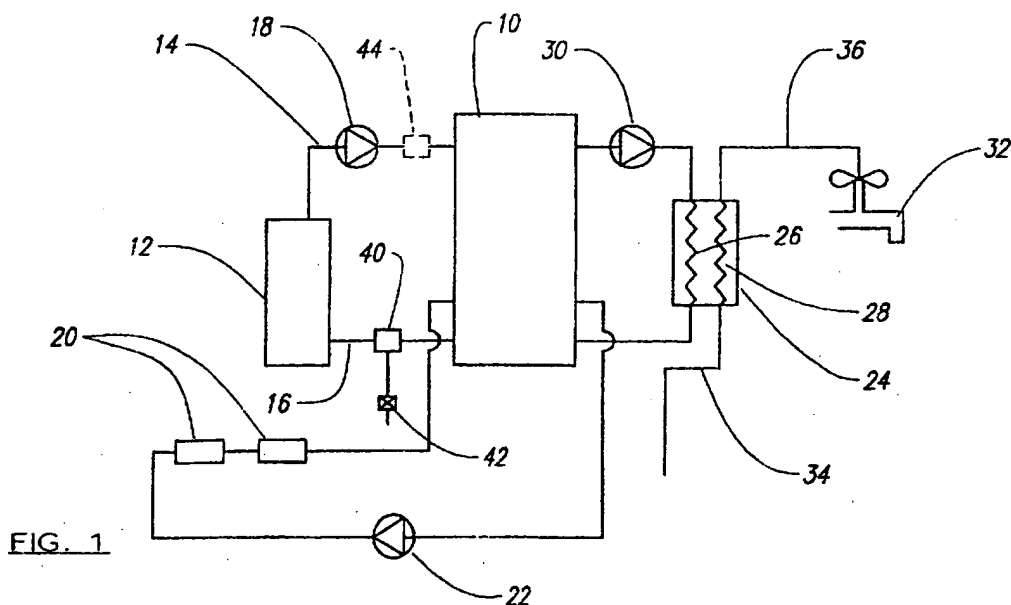
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(54) Abstract Title

Hot water system

(57) A hot water system for a dwelling comprises a thermal storage tank 10 and a primary water circuit heated by a gas or an oil fired boiler 12. The hot water system is also provided with an additional electric water heating means 44 which can be switched on selectively to heat the primary water in the hot water system. The electric water heating means 44 may be located in the pipe work connecting the boiler 12 and the storage tank 10. The electrical heating means 44 may be located in the pipe work connecting the storage tank 10 to a separate heat exchanger 24 provided for heating secondary water by heat exchange with primary water circulated through the heat exchanger 24 from the storage tank 10. The electric heating means 44 may be located in the storage tank 10. The electric heating means 44 may be a conventional 'instant hot water' type electrical heater used for heating water in electrical showers. The electric heating means 44 is used in emergencies when the boiler 12 is faulty.



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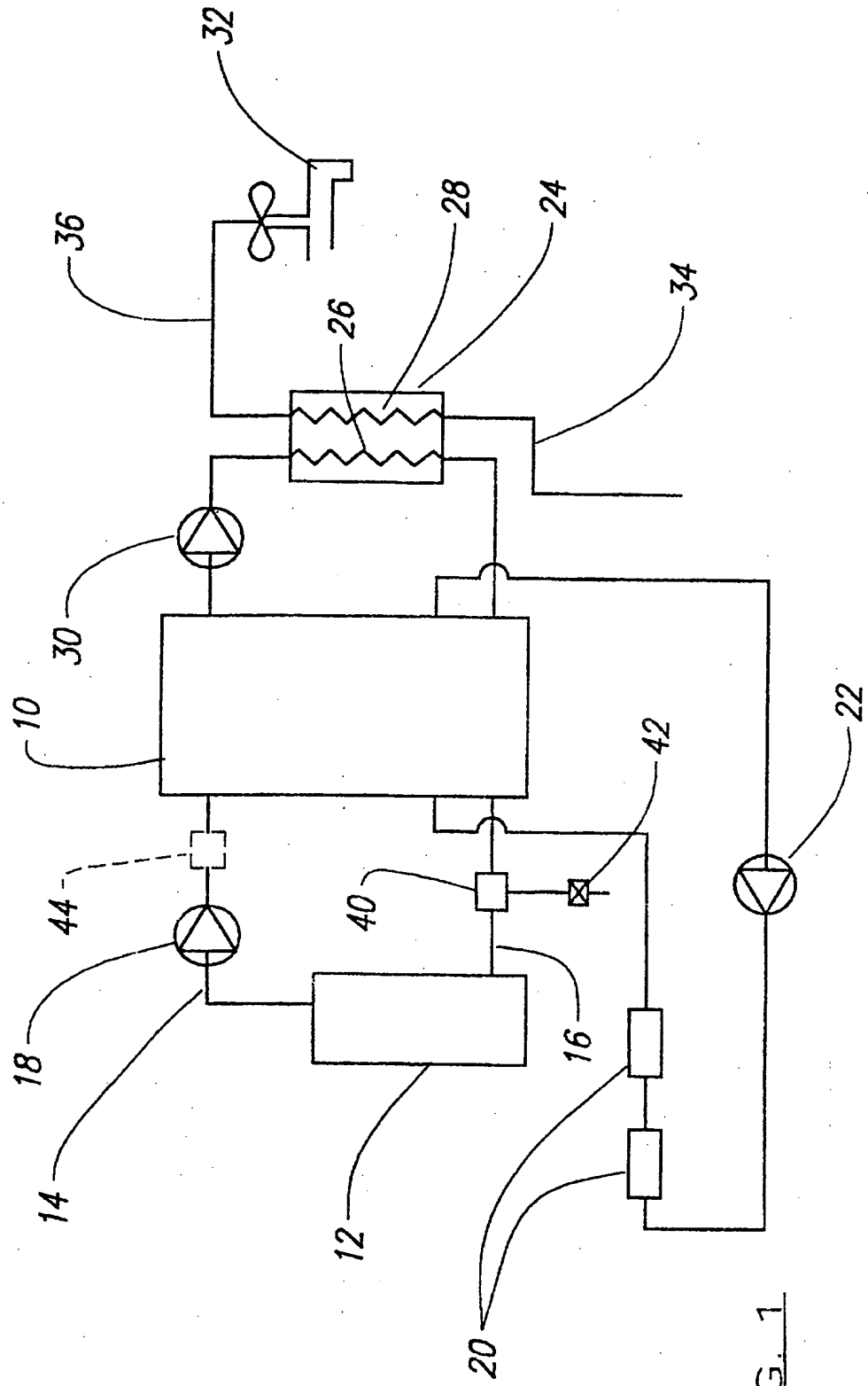


FIG. 1

Improvements Relating to Water Heating Apparatus

This invention relates to water heating apparatus, and in particular concerns water heating apparatus usable in connection with the heating of water for domestic dwellings. As the explanation of the invention proceeds, it will be appreciated that the invention may be adapted for the heating of water in other small buildings such as small offices and workshops, but as clearly the main application of the invention is for domestic water heating, references hereinafter will be limited to this application.

The methods of heating water in domestic dwellings have changed over the last fifteen years. Thus, prior to 1980 in the United Kingdom, water heating systems comprised a boiler and a water storage tank. The boiler served to heat the water in the storage tank by heat exchange, and the water in the tank could be drawn off at outlets such as taps in the dwelling for washing purposes. The water in the tank was referred to as secondary water, and was distinguished from what was referred to as the primary water which was contained in the central heating system connected directly to the boiler.

Such systems are still in use today in the United Kingdom, but more and more domestic hot water systems are based upon what is known as thermal storage. In thermal storage systems, again a storage tank has water contained therein, but this is heated directly by the boiler or electric immersion heating means, the boiler or electric immersion heating means operating to maintain the water in the tank at a pre-set level, for example in the order of 76 to 80°C. The water in the tank is the primary water, and also is circulated through the heating radiators when there is a demand. The secondary water (being cold water supplied directly from the mains) is heated by heat exchange by being passed through a heat exchanger in the primary water in the tank, or in

a heat exchanger unit separate from the water tank, but through which primary water from the tank is passed.

When there is a demand for heat or hot water, heat is drawn from the store which may or may not result in the boiler being fired or the electric heating means being switched on depending upon the size of the demand. The boiler or electric heating means reacts in relation to the temperature of the store, in order to add heat to the store when required. This may take place at times when the demand has terminated, and the thermal store therefore acts in a similar manner to the well-known electric thermal storage heaters. Thermal storage has been found to be a more economical system for the management and supply of hot water to a domestic dwelling.

A problem which has recently been encountered with thermal storage systems which use oil or gas fired boilers is that if the boiler or associated control fails (which is not uncommon with these boilers) then no heat is available for heating the water or the dwelling. This can create social problems if the failure lasts for more than a few hours, in that tenants, especially in council housing will demand immediate re-housing, and this usually means putting the tenants into a hotel. It is easy to see that such failures of the boilers were chronic, this could create massive problems.

The present invention in a simple and effective manner provides a solution to this problem, and in accordance with the invention, a gas or oil fired thermal storage system is provided additionally with an electric water heating means which can be switched on selectively by the occupant of the dwelling in emergencies, to heat the primary water in the system.

The electric water heating means will be installed using a safety wiring arrangement, to operate in a safe manner, such as being

arranged to operate under appropriate control so that the water does not overheat, which could make the system dangerous.

The invention has particular utility in that currently with homes being so well insulated and rooms being smaller, the boiler can be made quite small, and so a small electric heating means can perform the back up adequately. For example, a nine kilowatt heater giving the equivalent to a 30,000 Btu boiler can be used. Because such a small heater can be used, conveniently, such a heater can be one similar to that used in the "instant" hot water shower units, and it can be retro fitted easily to an existing thermal storage system, and can be fitted in the pipe work leading from the boiler to the thermal storage tank.

Of course, the electric heating means can be built into the system at any location, for example in the tank. In all cases, the electric heating means is operated by the occupier at will, particularly in the event of a boiler failure. Operation may be by means of a simple on/off switch readily accessible to the occupier.

It is preferred that the electric water heating means be fitted into the system when it is made so that all safety wiring can be completed under factory conditions.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, wherein the single figure shows diagrammatically a thermal storage system according to the invention.

In the drawing, 10 represents the storage tank of the thermal storage system. 12 is a gas or oil fired boiler, which is connected to circulate water (heated by the boiler 12) through pipes 14, 16 by means of a boiler pump 18. By this means the water in the tank 10 (primary water) is heated. Heat is supplied from the tank

depending upon the demand for space heating and/or hot water for washing. The heat available is dependent upon the temperature of the water in the tank, which is kept constant by thermostatic control.

20 represents domestic central heating radiators, through which the heated primary water is circulated on demand by a central heating pump 22.

24 is a heat exchanger having two coils 26 and 28. Hot primary water is circulated through coil 26 by means of circulating pump 30 when there is a demand for hot water, for example by the turning on of a tap 32 in the dwelling. This has the effect of causing cold mains supply water to pass through the pipe 34, coil 28 whereby the cold mains water (the secondary water) is heated, and finally through pipe 36 to the tap 32.

Should the boiler 12 fail, and there is no heat available to maintain the temperature of the water in the tank at the present level, the present invention provides a means of providing emergency heat. In particular, an electric heater 40 is installed (by retro fitting if need be) in the pipe 16, and it can be turned on by the occupier simply by throwing the switch 42. As long as the pumps of the system operate, so emergency heat will be supplied. If need be, the switch can also cause the supply of power to the pumps in case the pumps also have failed, but failure of the pumps is a very rare occurrence, whereas failure of a boiler is not unusual.

If the boiler is of a small type currently being used in homes, i.e. of the order of 30,000 Btu's then a nine Kw heater 40 would be sufficient to meet the emergency. Such heaters are available, and are used in electric "instant" hot water units for showers. It is to be remembered that the heater 40 will act to heat the stored primary water in the same manner as the boiler 12, at periods of

little or no demand, so the heater 40 is being used in a different manner than it is being used in an instant shower unit.

The heater 40 can be located in any suitable position for example as shown at 44 or even in the line containing the circulating pump 30, although this latter location may not be so convenient.

The heater 40 may be replaced by an electric heater positioned in the tank 10.

The invention provides in a simple way a solution to a serious problem for local authorities, in that they do not have to re-house tenants whose homes are heated by gas or oil fired thermal storage systems (which are now being used extensively) in the event of boiler failure.

CLAIMS

1. A gas or oil fired thermal storage system for a dwelling, provided additionally with an electric water heating means which can be switched on selectively by the occupant of the dwelling in emergencies, to heat the primary water in the system.
2. A system according to claim 1, wherein the electric water heating means is located in pipe work connecting the boiler and storage tank.
3. A system according to claim 2, wherein the electric water heating means is located in pipe work in which water is circulated from the storage tank to the boiler.
4. A system according to claim 2, wherein the electric water heating means is located in pipe work in which water is circulated from the boiler to the storage tank.
5. A system according to claim 1, wherein the electric heating means is located in pipe work connecting the storage tank to a separate heat exchanger provided for heating secondary water by heat exchange with primary water circulated through the heat exchanger from the storage tank.
6. A system according to claim 1, wherein the electric heating means is located in the storage tank.
7. A system according to any preceding claim, wherein the electric heating means is of the "instant hot water" type used for heating water in electric showers.
8. A system according to claim 7, wherein the electric heating means has a rating in the order of 9Kw.

9. A system according to claim 7 or 8, wherein the boiler has a rating in the order of 30,000 Btu's.
10. A system according to any preceding claim, wherein operation of the electric heating means is by means of a simple on/off switch readily accessible to the occupier of the dwelling.
11. A system according to any preceding claim, wherein the electric water heating means is fitted into the system when it is made so that all safety wiring is completed under factory conditions.



INVESTOR IN PEOPLE

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Claims searched: 1-11

Examiner: Kalim Yasseen
Date of search: 29 November 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): F4A (ADB); F4U (UC)

Int Cl (Ed.7): F24D (3/08, 12/02, 13/04)

Other: Online: EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2 237 864 A (HOLLIDGE) a hot water system having a subsidiary electrical heater 20 in a primary water circuit	at least 1, 2, 10
X	GB 2 220 260 A (BOYDSLAW) a central heating system having a secondary electrical heater 30 in a primary circuit	at least 1, 2, 10
X	GB 2 153 991 A (COLIN) a central heating system having a oil/gas fuel boiler and an auxiliary electrically powered boiler 20 in a primary heating circuit	at least 1, 2, 10
X	GB 0 705 617 A (DICKINSON) hot water storage system having an immersion heater in a chamber 'e' in a primary water circuit	at least 1, 4, 6

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family.	E Patent document published on or after, but with priority date earlier than, the filing date of this application.